

Online Resource 1: Windbreaks in the United States: results from the National Agroforestry Producer Survey (underlying data)

Table 1: Number and percent of respondents reporting various windbreak types (n = 2660)

Windbreak type	#	%
Farmstead-only	186	7.0
Field-only	107	4.0
Livestock-only	171	6.4
Boundary-only	123	4.6
Living snow fence-only	7	0.3
Hedgerow-only	123	4.6
Multiple windbreak types	1,890	71.1
Other-only	53	2.0

Table notes: Data for specific windbreak types represent a subset of the sample when “-only” is attached to the windbreak name. For example, the number of producers with farmstead windbreaks was 1585. However, the number that only had farmstead windbreaks (farmstead-only) and not any other type of windbreak was 186. To truly understand producer management and perspectives, several analyses required windbreak type to be exclusive.

Table 2: Number of producers responding to the survey by U.S. state and number of producers in sample with windbreaks

State	Number who responded	Number with windbreaks
Alabama	157	57
Alaska	18	12
Arizona	6	P
Arkansas	154	52
California	150	49
Colorado	99	54
Connecticut	33	13
Delaware	5	P
Florida	145	61
Georgia	169	57
Hawai‘i	58	36

Idaho	91	50
Illinois	151	81
Indiana	150	75
Iowa	182	114
Kansas	114	78
Kentucky	154	62
Louisiana	78	26
Maine	70	33
Maryland	105	51
Massachusetts	62	27
Michigan	168	101
Minnesota	183	128
Mississippi	139	44
Missouri	178	92
Montana	95	50
Nebraska	123	111
Nevada	P	0
New Hampshire	33	15
New Jersey	64	32
New Mexico	50	24
New York	150	98
North Carolina	192	71
North Dakota	53	44
Ohio	170	94
Oklahoma	142	49
Oregon	189	60
Pennsylvania	172	91
Rhode Island	7	P

South Carolina	151	67
South Dakota	81	67
Tennessee	197	81
Texas	187	71
Utah	24	13
Vermont	107	52
Virginia	182	53
Washington	154	61
West Virginia	134	38
Wisconsin	189	120
Wyoming	14	9
Total	5,682	2734

Table notes: response rate across all U.S. states was 52%. Cell values with a “P” represent the presence of data where the $n < 5$, which are masked for disclosure purposes.

Table 3: Number and percent of respondents reporting other types of windbreaks being used on their operation (n = 256)

Other windbreak types	#	%
Wildlife, wildlife food plots, wildlife corridors, pollinator forage	64	25.00
Riparian buffers, riparian enclosures, border around waterways	43	16.80
Response not valid	39	15.23
Woodlot, certified Tree Farm, timber, orchard, timber farming, woodland, Christmas tree farm, and fruit trees	29	11.33
Existing response option	27	10.55
Natural windbreak, natural forest	13	5.08
Privacy/aesthetics windbreak	13	5.08
Chemical drift windbreak	8	3.13
Other agroforestry practice (alley cropping and or silvopasture)	8	3.13
Roadway windbreak/buffer	6	2.34
Garden windbreak/human food	6	2.34

Table notes: data comes from an open-ended question.

Table 4: Average acreage of windbreaks per farm operation by United States Department of Agriculture Farm Production Region

USDA Farm Production Region	Weighted number of respondents	Average windbreak acres per farm operation	Standard deviation
Pacific	578	10.48	50.71
Northern Mountain	92	15.93	62.92
Southern Mountain	64	9.03	17.88
Northern Plains	394	15.05	23.18
Southern Plains	242	25.84	52.82
Lake States	1157	8.59	15.24
Corn Belt	1405	7.46	12.48
Delta States	184	14.39	15.30
New England	200	6.54	9.14
Mid-Atlantic	1016	7.97	12.62
Appalachia	838	8.67	12.71
Southeast	487	15.49	25.80
Alaska	7	11.14	13.28
Hawai'i	23	12.70	41.21
All U.S.	6686	10.16	24.66

Table notes: data based on weighting the survey respondent data to extrapolate to the U.S. Census of Agriculture national estimates. Refer to the methods section for explanation on weighting.

Table 5: Total acreage in windbreaks by United States Department of Agriculture Farm Production Region

USDA Farm Production Region	Weighted number of operations with windbreaks	Total windbreak acreage
Pacific	1139	11,937
Northern Mountain	170	2,708
Southern Mountain	150	1,355
Northern Plains	603	9,075
Southern Plains	580	14,987
Lake States	1962	16,854
Corn Belt	2265	16,897
Delta States	306	4,403
New England	305	1,995
Mid-Atlantic	1719	13,700
Appalachia	1669	14,470
Southeast	887	13,740
Alaska	12	134
Hawai'i	60	762
All U.S.	11,827	123,017

Table notes: data based on weighting the survey respondent data to extrapolate to the U.S. Census of Agriculture national estimates. Refer to the methods section for explanation on weighting. The weighted n value in this table is higher than Table 4 since that table uses only windbreak respondents who reported acreage in the practice. The total acreage for “All U.S.” in windbreaks was based on the sum of each regional value.

Table 6: Average windbreak acreage per farm operation by windbreak type

Windbreak type	Weighted number of respondents	Average windbreak acres per farm operation	Standard deviation
Farmstead-only	477	4.13	6.23
Field-only	222	7.66	22.63
Livestock-only	400	24.42	68.54
Boundary-only	286	6.60	8.80
Hedgerow-only	261	8.47	14.77

Table notes: data based on weighting the survey respondent data to extrapolate to the U.S. Census of Agriculture national estimates. Refer to the methods section for explanation on weighting. Refer to Table 5 above for acreage data for All Windbreak Types.

Table 7: Number and percent of farm operations with windbreaks by farm size class (weighted n = 11,827)

Farm size class (acres)	Weighted number of respondents	Percent of respondents
1 – 9	737	6.23
10 – 49	3264	27.59
50 – 179	4120	34.84
180 – 499	2322	19.63
500 – 999	810	6.85
1000 – 4999	537	4.54
5000 +	37	0.31

Table notes: data based on weighting the survey respondent data to extrapolate to the U.S. Census of Agriculture national estimates. Refer to the methods section for explanation on weighting.

Table 8: Percent of land in windbreaks per farm operation by United States Department of Agriculture Farm Production Region

USDA Farm Production Region	Weighted n	Average farm acres	Standard deviation	Percent of land in windbreaks per farm operation
Pacific	1139	358.51	2388.33	2.92
Northern Mountain	170	834.59	1849.30	1.91
Southern Mountain	150	216.18	619.35	4.18
Northern Plains	603	657.53	1477.14	2.29
Southern Plains	580	247.66	398.41	10.43
Lake States	1962	236.74	394.07	3.63
Corn Belt	2265	263.45	443.02	2.83
Delta States	306	365.61	587.05	3.94
New England	305	149.44	159.49	4.38
Mid-Atlantic	1719	152.16	220.79	5.24
Appalachia	1669	157.00	237.64	5.52
Southeast	887	288.55	482.41	5.37
Alaska	12	341.67	538.50	3.26
Hawai'i	60	86.65	392.11	14.66
All U.S.	11,827	264.68	919.56	3.84

Table notes: data based on weighting the survey respondent data to extrapolate to the U.S. Census of Agriculture national estimates. Refer to the methods section for explanation on weighting.

Table 9: Average weighted farm size (acres) by windbreak type

Windbreak type	Weighted number of respondents	Average farm size (acres)	Standard deviation
Farmstead-only	798	336.15	691.44
Field-only	442	123.47	210.96
Livestock-only	750	323.83	631.76
Boundary-only	522	208.37	397.78
Hedgerow-only	562	228.77	388.16

Table notes: data based on weighting the survey respondent data to extrapolate to the U.S. Census of Agriculture national estimates. Refer to the methods section for explanation on weighting. Refer to Table 8 above for average farm size data for All Windbreak Types.

Table 10: Number of respondents using various establishment activities by windbreak sub-type

Establishment activities	Farmstead-only			Field-only			Livestock-only			Boundary-only			Hedgerow-only			All windbreak types		
	Y	N	DK	Y	N	DK	Y	N	DK	Y	N	DK	Y	N	DK	Y	N	DK
Hand planted tree seedlings	138	32	8	62	33	5	54	96	5	49	54	P	68	42	P	1656	787	72
Mechanically planted tree seedlings	24	121	12	19	69	P	12	127	6	11	85	P	28	77	P	465	1807	87
Herbicides for weed control	30	117	13	20	70	P	17	121	6	22	73	P	35	67	P	550	1727	97
Cultivation for weed control	57	93	11	33	57	P	16	125	5	20	72	5	33	69	5	908	1373	98
Barrier weed control	36	115	11	19	68	P	16	125	P	15	81	P	19	84	P	616	1684	68
Irrigated trees 1-3 years post planting	78	78	11	36	59	P	16	127	5	18	78	P	32	69	6	930	1389	87
Controlled weeds 1-3 years post planting	97	60	10	50	44	P	37	103	6	38	60	P	49	51	6	1297	1039	90
Installed tree protection (tubes or fence)	72	82	8	31	62	P	62	87	P	32	67	P	46	60	P	1198	1173	56
Replanted tree seedlings to fill gaps	80	75	11	37	57	P	29	116	P	26	72	P	46	59	P	1112	1227	68
Trees grew naturally without planting	70	85	5	44	48	0	102	45	P	62	34	P	54	50	5	1527	807	66

Table notes: Y = yes, N = no, DK = don't know. Cell values with a "P" represent the presence of data where the $n < 5$. The specific value could not be shown due to disclosure rules.

Table 11: Number and percent of respondents reporting other establishment activities to implement their windbreaks (n = 157)

Other establishment activities	#	%	Notes
Existing response option	69	43.95	Of the 69 responses, 16 were related to natural regeneration, which was a response option.
Response is not an establishment method	32	20.38	
Planted grasses and shrubs	11	7.01	
System already there	9	5.73	
Used tree cuttings, nuts/seeds, and or transplants	9	5.73	
Removed debris and dead trees and pruning	7	4.46	
Other	22	14.01	Responses with n < 5 included fertilization, prescribed burn, thinning excess tree seedlings, removing brush, and installing raptor perching poles.

Table notes: data comes from an open-ended question. Several respondents input multiple “other” establishment activities. Hence, row n-values does not sum to total number of respondents.

Table 12: Number and percent of respondents establishing windbreaks during various time periods

Time period	Farmstead-only (n = 183)		Field-only (n = 105)		Livestock-only (n = 169)		Boundary-only (n = 118)		Hedgerow-only (n = 121)		All windbreak types (n = 2658)	
	#	%	#	%	#	%	#	%	#	%	#	%
< 5 years	25	13.66	11	10.48	14	8.28	13	11.02	24	19.83	531	19.98
5 to < 10 years	28	15.30	14	13.33	21	12.43	13	11.02	22	18.18	563	21.18
10 to < 15 years	26	14.21	16	15.24	22	13.02	16	13.56	16	13.22	569	21.41
≥ 15 years	137	74.86	71	67.62	107	63.31	63	53.39	62	51.24	1,850	69.60
Don't know	10	5.46	6	5.71	21	12.43	21	17.80	18	14.88	222	8.35

Table notes: many respondents established windbreaks over multiple time periods. Hence, n-values per windbreak type do not sum to total number of respondents for that windbreak type.

Table 13: Number and percent of respondents with windbreaks reporting use of various information sources to learn about agroforestry

	Yes		No	
Information Source	#	%	#	%
Other farmers or farmer groups	1,277	54.34	1073	45.66
Conservation district staff	1,357	57.40	1007	42.60
Private forester	777	33.45	1546	66.55
For-profit consultants	299	13.09	1985	86.91
Non-profit organization	574	25.09	1714	74.91
University cooperative extension	1,349	57.38	1002	42.62
State staff	1,085	46.41	1253	53.59
Federal staff	613	26.66	1686	73.34
Internet	1,503	63.55	862	36.45
Social media	367	16.07	1917	83.93
Email/e-newsletter	585	25.71	1690	74.29
Farming/conservation magazines	1,367	57.95	992	42.05
Books, print newsletters, brochures	1,579	67.22	770	32.78
Scientific journals	499	21.91	1779	78.09
Have someone visit this operation	1,006	43.47	1308	56.53
Visit a different operation (field tour, demonstration, etc.)	916	39.65	1394	60.35
Conference or workshop	911	39.68	1385	60.32

Table 14: Other information sources used by respondents with windbreaks to learn about agroforestry (n = 35)

Other information sources	#	%	Notes
Personal experience	11	31.43	
Existing response option	11	31.43	University extension, non-profit, federal staff, field day, internet, and farmer groups.
Other	15	42.86	Responses with n < 5 included college courses, county district staff, forestry consultants, nurseries, family/generational experience, friends, and online webinars.

Table notes: data comes from an open-ended question. Several respondents input multiple “other” information sources. Hence, row n does not sum to total number of respondents.

Table 15: Number and percent of respondents who reported that an information source was most useful to their operation (n = 2061)

Information source	#	%
Other farmers or farmer groups	552	26.78
Conservation district staff	672	32.61
Private forester	259	12.57
For-profit consultants	87	4.22
Non-profit organization	108	5.24
University cooperative extension	708	34.35
State staff	515	24.99
Federal staff	247	11.98
Internet	646	31.34
Social media	42	2.04
Email/e-newsletter	67	3.25
Farming/conservation magazines	434	21.06
Books, print newsletters, brochures	489	23.73
Scientific journals	92	4.46
Have someone visit this operation	174	8.44
Visit a different operation (field tour, demonstration site, etc.)	193	9.36
Conference or workshop	245	11.89
Other	107	5.19

Table 16: Number of respondents using various management activities for their windbreaks by windbreak sub-type

Management activities	Farmstead-only			Field-only			Livestock-only			Boundary-only			Hedgerow-only			All windbreak types		
	Y	N	DK	Y	N	DK	Y	N	DK	Y	N	DK	Y	N	DK	Y	N	DK
Mowing/cultivation for weed control	72	92	6	45	51	P	47	103	P	42	61	P	43	60	5	1305	1108	43
Herbicides for weed control	45	114	8	29	71	P	51	93	5	37	62	P	39	65	0	874	1523	42
Barrier weed control	27	129	9	16	77	P	9	136	P	15	83	P	16	85	P	528	1791	61
Flash or short duration grazing	29	132	5	10	81	P	63	82	P	15	79	P	17	85	P	704	1612	72
Pruning tree branches	94	67	8	57	41	P	82	70	P	65	38	P	64	45	P	1717	742	43
Replanting trees	81	80	9	33	62	P	29	115	5	28	67	P	39	68	P	1108	1210	95
Removing living or dead trees	120	48	8	56	38	P	105	49	P	70	35	P	64	45	P	1866	599	47
Irrigation of trees	50	106	12	23	73	P	8	137	P	13	86	0	22	82	P	628	1711	58
Fertilizer or soil amendments	39	117	9	19	75	P	16	131	P	19	80	0	21	81	P	605	1698	80
Root pruning	6	148	8	P	90	P	10	132	P	9	88	P	8	94	P	191	2108	68
Tree protection (tubes or fence)	61	89	9	20	72	P	41	97	P	23	68	P	30	71	P	937	1263	84

Table notes: Y = yes, N = no, DK = don't know. Cell values with a "P" represent the presence of data where $n < 5$. The specific value could not be shown due to disclosure rules.

Table 17: Number and percent of respondents using other management activities for their windbreaks (n = 132)

Other management activities	#	%	Notes
Response option exists	40	30.30	Most existing response options relate to mowing weeds and thinning living or dead trees.
Not a management practice	22	16.67	
Prescribed burning	14	10.61	
Control of invasive species	11	8.33	
Control of pests, disease, and nuisance wildlife	10	7.58	
Harvesting trees and crops	9	6.82	
No management	7	5.30	
Adding new trees/shrubs/grass	6	4.55	
Other	11	8.33	Other responses with n < 5 included hand weeding, maintaining public trails, fabric removal, soil testing, and removal of nuisance wildlife.

Table notes: data comes from an open-ended question.

Table 18: Funding sources used by respondents to establish and or manage their windbreaks

Funding Source	Yes		No	
	#	%	#	%
Self-funded	505	88.60	65	11.40
Loans from banks or credit unions	24	4.64	493	95.36
Loans from private investors	5	0.97	511	99.03
Federal funding (grants, loans, cost share, etc.)	137	24.38	425	75.62
State funding (grants, loans, cost share, etc.)	65	11.67	492	88.33
Funding from a non-governmental organization	9	1.63	544	98.37

Table 19a: Federal funding programs used by respondents to establish and or manage their windbreaks (n = 142)

Federal programs	#	%	Notes
Farm Service Agency (FSA)	55	38.73	Conservation Reserve Program (CRP), Continuous Conservation Reserve Program (CCRP) (46), Wildfire and Hurricane Indemnity Program (WHIP), and Conservation Reserve Enhancement Program (CREP).
Natural Resources Conservation Service (NRCS)	46	32.39	Environmental Quality Incentives Program (EQIP) (16), Conservation Stewardship Program (CSP), and Wetland Reserve Program (WRP).
Unspecified federal cost share	15	10.56	
Not a funding source	19	13.38	
Non-federal program listed	7	4.93	
Other	6	4.23	Unspecified USDA program, Rural Development (RD) Rural Energy for America Program (REAP), and research grants.

Table notes: data comes from an open-ended question. Several respondents input multiple funding sources. Hence, row n does not sum to total number of respondents.

Table 19b: State funding programs used by respondents to establish and or manage their windbreaks (n = 64)

State programs	#	%	Notes
Federal program	19	29.69	Includes USDA Farm Service Agency and Natural Resources Conservation Service programs, such as the Conservation Reserve Program and the Environmental Quality Incentives Program.
State program not specified	19	29.69	
State-specific program mentioned	26	40.63	State programs mentioned included: California Healthy Soil Grant, California State Water Efficiency and Enhancement Program (SWEET), Colorado State Forest Service, Idaho Habitat Improvement Program (HIP), Minnesota Department of Natural Resources, North Dakota Forest Service Windbreak Renovation Initiative, Virginia Department of Forestry Cost Share Program, and Wisconsin Managed Forest Law.

Table notes: data comes from an open-ended question.

Table 20: Number of producers reporting they experienced a specific windbreak benefit

	Farmstead-only			Field-only			Livestock-only			Boundary-only			Hedgerow-only			All windbreak types		
Windbreak benefits	Y	N	DK	Y	N	DK	Y	N	DK	Y	N	DK	Y	N	DK	Y	N	DK
Improved erosion control	113	47	11	77	16	P	115	28	15	85	16	9	90	13	6	2128	275	138
Improved soil health	82	46	36	54	19	19	73	39	39	57	21	26	59	23	20	1547	386	528
Beneficial insect habitat	120	26	21	83	10	7	111	17	27	87	12	8	95	9	9	2198	148	187
Wildlife habitat	156	11	7	85	9	P	139	14	P	103	P	P	110	5	P	2462	82	42
Improved water quality	80	40	44	42	26	25	81	29	44	59	22	28	71	20	17	1619	340	530
Improved nutrient management	54	54	55	31	25	37	50	43	55	44	24	36	52	29	25	1175	496	754
Chemical drift mitigation	55	72	38	43	32	18	35	73	42	43	36	24	41	49	16	1008	856	553
Dust mitigation	83	56	26	49	29	14	55	59	35	46	35	21	50	36	22	1409	633	395
Increased carbon storage	109	19	38	63	P	31	83	22	46	74	10	24	82	10	21	1850	147	516
Increased crop production	21	98	44	39	28	25	24	93	34	22	52	31	14	65	26	703	1017	719
Improved crop quality	21	98	44	44	29	21	22	92	37	26	50	29	23	58	23	746	960	721
Income from sale of products	19	133	11	9	74	7	35	100	13	19	70	16	17	77	10	571	1623	223
Crops and products for personal use	64	93	10	30	54	7	67	69	15	51	39	17	46	55	5	1418	881	164
Improved livestock welfare	68	81	16	21	58	10	148	P	5	38	50	17	43	54	7	1624	674	187
Increased livestock production	23	113	28	10	65	13	84	50	19	16	68	18	18	72	13	719	1213	471
Snow management	95	60	11	23	58	9	46	88	16	22	64	18	30	64	11	1106	1058	262
Protection of farm structures	152	13	6	35	50	8	52	87	15	33	58	15	35	62	5	1699	673	138
Income diversification	20	127	16	17	66	8	25	104	20	16	75	14	12	85	6	548	1535	318
Farm energy conservation	104	43	19	23	52	13	33	90	27	21	64	19	25	66	10	1206	851	382
Increased water use efficiency	21	112	30	25	50	17	24	104	21	9	71	24	20	71	12	564	1277	555
Hunting lease revenue	7	151	8	5	80	P	16	127	7	P	88	10	11	89	6	199	2081	138
Reduced spread of tree diseases	12	85	65	10	44	32	17	88	44	9	53	41	12	62	31	292	1133	966
Improvement of marginal land	63	83	19	25	51	14	63	62	24	45	39	20	54	42	12	1351	777	319
Increased land value	72	46	47	39	33	20	63	56	32	38	34	32	49	33	27	1227	565	674

Conservation payments	26	127	10	17	70	P	15	121	14	20	77	8	27	72	7	477	1741	199
Resilience to weather extremes	81	51	32	49	28	15	71	56	28	36	31	35	49	33	24	1452	508	497
Improved working environment	153	15	5	83	10	P	104	38	14	63	29	16	60	37	13	2083	305	143
Aesthetics	159	9	P	76	15	P	118	27	11	93	9	7	93	16	P	2275	168	95
Privacy/visual screening	137	26	5	72	23	P	94	50	10	90	13	5	75	30	P	2106	335	84
Hunting	48	114	5	28	59	P	81	69	P	58	40	9	67	42	P	1331	1026	132
Recreation other than hunting	49	102	13	27	57	5	54	88	9	43	49	10	48	55	5	1207	1040	179
Odor reduction	31	113	21	9	66	14	24	99	27	20	60	23	20	70	15	552	1320	516
Noise reduction	81	66	17	38	37	13	58	69	21	49	38	14	37	54	12	1314	780	302

Table notes: Y = yes, N = no, DK = don't know. Cell values with a "P" represent the presence of data where $n < 5$. The specific value could not be shown due to disclosure rules.

Table 21: Number and percent of respondents who selected a windbreak benefit as most important to their farm operation

	Farmstead-only (n = 154)		Field-only (n = 88)		Livestock-only (n = 140)		Boundary-only (n = 85)		Hedgerow-only (n = 95)		All windbreaks (n = 2214)	
Benefits	#	%	#	%	#	%	#	%	#	%	#	%
Improved erosion control	23	15	23	26	32	23	24	28	21	22	533	24
Improved soil health	P	0.6-2.6	13	15	17	12	7	8	9	9	161	7
Beneficial insect habitat	18	12	20	23	13	9	14	16	23	24	410	19
Wildlife habitat	34	22	20	23	36	26	18	21	57	60	743	34
Improved water quality	7	5	5	6	15	11	5	6	17	18	176	8
Improved nutrient management	P	0.6-2.6	0	0	P	0.7-2.9	P	1.2-4.7	P	1.1-4.2	37	2
Chemical drift mitigation	P	0.6-2.6	6	7	P	0.7-2.9	P	1.2-4.7	0	0	80	4
Dust mitigation	6	4	P	1.1-4.5	P	0.7-2.9	P	1.2-4.7	5	5	87	4
Increased carbon storage	6	4	5	6	10	7	7	8	13	14	148	7
Increased crop production	P	0.6-2.6	8	9	P	0.7-2.9	0	0	P	1.1-4.2	60	3
Improved crop quality	P	0.6-2.6	7	8	P	0.7-2.9	0	0	0	0	45	2
Income from sale of products	P	0.6-2.6	P	1.1-4.5	10	7	P	1.2-4.7	P	1.1-4.2	101	5
Crops and products for personal use	P	0.6-2.6	6	7	8	6	7	8	8	8	154	7
Improved livestock welfare	15	10	6	7	89	64	16	19	11	12	599	27
Increased livestock production	P	0.6-2.6	0	0	20	14	0	0	P	1.1-4.2	93	4
Snow management	33	21	P	1.1-4.5	7	5	0	0	P	1.1-4.2	201	9
Protection of farm structures	60	39	9	10	8	6	5	6	P	1.1-4.2	349	16
Income diversification	P	0.6-2.6	6	7	P	0.7-2.9	P	1.2-4.7	P	1.1-4.2	55	2
Farm energy conservation	20	13	P	1.1-4.5	P	0.7-2.9	P	1.2-4.7	P	1.1-4.2	91	4
Increased water use efficiency	P	0.6-2.6	P	1.1-4.5	P	0.7-2.9	0	0	P	1.1-4.2	29	1
Hunting lease revenue	P	0.6-2.6	P	1.1-4.5	P	0.7-2.9	P	1.2-4.7	P	1.1-4.2	31	1
Reduced spread of tree diseases	P	0.6-2.6	P	1.1-4.5	P	0.7-2.9	0	0	0	0	13	1
Improvement of marginal land	P	0.6-2.6	P	1.1-4.5	7	5	6	7	P	1.1-4.2	102	5

Increase land value	7	5	7	8	8	6	5	6	P	1.1-4.2	120	5
Conservation payments	P	0.6-2.6	P	1.1-4.5	P	0.7-2.9	P	1.2-4.7	P	1.1-4.2	57	3
Resilience to weather extremes	8	5	10	11	9	6	P	1.2-4.7	P	1.1-4.2	123	6
Improved working environment	63	41	22	25	12	9	13	15	P	1.1-4.2	437	20
Aesthetics	47	31	19	22	28	20	35	41	18	19	530	24
Privacy/visual screening	37	24	14	16	13	9	29	34	10	11	386	17
Hunting	5	3	5	6	13	9	19	22	22	23	207	9
Recreation other than hunting	7	5	P	1.1-4.5	P	0.7-2.9	P	1.2-4.7	5	5	75	3
Odor reduction	P	0.6-2.6	P	1.1-4.5	P	0.7-2.9	0	0	P	1.1-4.2	22	1
Noise reduction	P	0.6-2.6	0	0	10	7	5	6	P	1.1-4.2	102	5
Other	P	0.6-2.6	9	10	P	0.7-2.9	P	1.2-4.7	P	1.1-4.2	66	3

Table notes: cell values with a “P” represent the presence of data where n < 5. The associated percents are shown as a range to accommodate disclosure rules.

Table 22: Number and percent of respondents reporting other windbreak benefits (n = 158)

Other windbreak benefits	#	%	Notes
Existing response option	120	75.95	Included wildlife habitat/pollinator habitat (37), recreation (13), crops/products (12), livestock improvement (10), privacy (10), carbon storage (5), wind protection (5), aesthetics, chemical drift control, crop protection, dust control, improved water quality, beneficial insects, hunting, farm diversification, increased value of marginal land, and soil protection.
Not a benefit or viable response	9	5.70	
Happiness/personal health	7	4.43	
Shade	7	4.43	
Stewardship/sustainability	6	3.80	
Riparian/wetland protection	5	3.16	
Other	9	5.70	Clean air, mulch/fertilizer, home resale, and lightning protection.

Table notes: data comes from an open-ended question. Several respondents input multiple other benefits. Hence, row n does not sum to total number of respondents.

Table 23: Number of producers reporting various challenges experienced when establishing or managing their windbreaks

	Farmstead-only			Field-only			Livestock-only			Boundary-only			Hedgerow-only			All windbreak types		
Windbreak challenges	Y	N	DK	Y	N	DK	Y	N	DK	Y	N	DK	Y	N	DK	Y	N	DK
Lack of establishment information	16	125	20	16	73	6	22	112	14	6	79	14	14	88	8	358	1845	244
Difficulty establishing vegetation	59	96	12	34	58	P	30	114	10	27	68	8	35	69	7	895	1452	143
High startup costs	31	109	22	24	65	7	36	99	16	25	64	10	31	70	9	825	1442	195
Lack of management information	21	121	16	22	67	6	21	119	10	11	76	14	13	88	8	429	1799	218
Difficulty regrowing trees	51	102	10	16	70	9	22	110	18	13	73	14	16	84	10	595	1630	214
Expense of maintenance	36	112	13	34	58	5	29	110	13	33	59	10	34	70	6	853	1481	145
Lack of information on recommended species	25	118	16	12	75	7	24	118	9	12	76	13	16	87	5	426	1824	193
Lack of technical service provider knowledge	16	126	16	10	75	10	13	117	20	13	74	15	12	85	12	333	1758	346
Lack of examples or demo sites	18	117	23	13	71	11	22	107	20	13	67	20	19	80	9	460	1612	356
Lack of financial assistance	31	108	21	23	63	9	34	100	16	28	57	16	30	70	9	752	1397	301
Lack of markets for products	19	105	33	9	73	13	19	104	27	18	65	16	9	83	15	377	1608	432
Loss of cropland	35	113	11	16	77	P	29	110	11	21	68	13	19	83	6	567	1725	149
Harbors crop pests	35	110	18	22	66	8	29	106	15	15	74	14	25	74	12	533	1631	293
Conflict with farm equipment or layout	23	125	11	12	81	P	25	114	12	23	72	9	15	84	8	501	1791	153
Tree and crop competition	40	113	7	17	75	P	39	103	9	29	63	13	14	88	7	699	1581	161
Livestock damage to trees	26	129	7	10	82	P	37	105	9	16	77	9	9	93	5	566	1761	119
Wildlife damage to trees	79	76	8	33	58	5	41	101	12	36	59	9	39	62	8	1074	1284	132
Tree/shrub pests & diseases	49	100	13	30	58	7	33	100	15	23	66	13	26	72	10	751	1448	252
Herbicide damage	18	131	10	6	83	6	10	127	12	11	79	12	11	90	8	256	1968	208
Snow drifts	16	135	8	P	87	P	9	128	13	P	89	8	P	99	6	183	2108	134
Adds labor and complexity	51	95	10	26	66	P	37	95	14	40	55	8	36	72	P	1026	1279	148

Table notes: Y = yes, N = no, DK = don't know. Cell values with a "P" represent the presence of data where $n < 5$. The specific value could not be shown due to disclosure rules.

Table 24: Number and percent of respondents who selected a windbreak challenge as being most important to their farm operation

	Farmstead-only (n = 140)		Field-only (n = 74)		Livestock-only (n = 120)		Boundary-only (n = 88)		Hedgerow-only (n = 94)		All windbreaks (n = 2112)	
Challenge	#	%	#	%	#	%	#	%	#	%	#	%
Lack of establishment information	5	4	9	12	9	8	7	8	13	14	144	7
Difficulty establishing vegetation	30	21	17	23	15	13	14	16	18	19	447	21
High startup costs	22	16	16	22	23	19	12	14	20	21	465	22
Lack of management information	5	4	6	8	10	8	6	7	P	1.1-4.3	121	6
Difficulty regrowing trees	16	11	P	1.4-5.4	9	8	6	7	P	1.1-4.3	194	9
Expense of maintenance	18	13	19	26	21	18	16	18	18	19	443	21
Lack of information on recommended species	8	6	P	1.4-5.4	13	11	P	1.1-4.5	7	7	120	6
Lack of technical service provider knowledge	6	4	P	1.4-5.4	P	0.8-3.3	P	1.1-4.5	P	1.1-4.3	79	4
Lack of examples/demo sites	P	0.7-2.9	P	1.4-5.4	P	0.8-3.3	P	1.1-4.5	P	1.1-4.3	69	3
Lack of financial assistance	14	10	10	14	17	14	17	19	23	24	361	17
Lack of markets for products	P	0.7-2.9	P	1.4-5.4	12	10	7	8	P	1.1-4.3	110	5
Loss of cropland	18	13	P	1.4-5.4	19	16	8	9	10	11	256	12
Harbors crop pests	14	10	6	8	11	9	10	11	15	16	211	10
Conflict with farm equipment or layout	12	9	5	7	12	10	13	15	7	7	226	11
Tree and crop competition	23	16	9	12	24	20	16	18	8	9	286	14
Livestock damage to trees	12	9	0	0	19	16	8	9	P	1.1-4.3	219	10
Wildlife damage to trees	50	36	17	23	23	19	25	28	28	30	555	26
Tree/shrub pests & disease	27	19	17	23	16	13	12	14	14	15	307	15
Herbicide damage	8	6	5	7	P	0.8-3.3	6	7	P	1.1-4.3	110	5
Snow drifts	8	6	P	1.4-5.4	6	5	P	1.1-4.5	P	1.1-4.3	60	3
Adds labor and complexity	28	20	12	16	21	18	27	31	19	20	519	25
Other	7	5	12	16	8	7	8	9	12	13	185	9

Table notes: cell values with a “P” represent the presence of data where n < 5. The associated percents are shown as a range to accommodate disclosure rules.

Table 25: Number and percent of respondents reporting other challenges experienced when establishing or managing their windbreaks (n = 257)

Other challenges	#	%	Notes
Existing response option	139	54.09	Includes added labor and complexity to management (61 - half of these were specifically related to maintenance or cleaning up falling trees and branches), wildlife (17), conflict with farm management (13), harbors harmful crop pests (invasives) (20), herbicide damage (11), high startup costs (6), lack of technical assistance, lack of info on species selection, tree disease, and lack of markets.
Weather damage	24	9.34	Hurricane, derecho, flood, wildfire, and frost.
Drought/lack of water	22	8.56	
Not a challenge or viable response	19	7.39	
Neighbor issues	11	4.28	
Encroachment of windbreak trees	8	3.11	
Soil incompatibility	7	2.72	
Age of operator	6	2.33	
Other	26	10.12	Responses with n < 5 included government red tape, plant material shortage and cost, lack of workers to plant trees, old and dying trees, slow return on investment, clearing the land, landlord does not want windbreaks, roots interfere with crops and drainage, space requirement, plants poisoning livestock, and planting date was wrong.

Table notes: data comes from an open-ended question. Several respondents reported multiple other challenges. Hence, n-values do not sum to total number of respondents.

Table 26: Number and percent of respondents who sold, plan to sell, or use crops and products from their windbreaks

Windbreak type	Sold		Plan to sell		Personal or on-farm use	
	#	%	#	%	#	%
Farmstead-only (n = 186)	43	23.1	37	19.9	125	67.2
Field-only (n = 107)	29	27.1	25	23.4	63	58.9
Livestock-only (n = 171)	60	35.1	42	24.6	134	78.4
Boundary-only (n = 123)	42	34.2	40	32.5	90	73.2
Hedgerow-only (n = 123)	28	22.8	27	22.0	81	65.9
All windbreak types (n = 2734)	914	33.4	881	32.2	2148	78.6

Table notes: several respondents selected multiple response options for having sold, plan to sell, and use personally. Hence, n-values do not sum to total number of respondents.

Table 27: Number and percent of respondents who sold crops and products from windbreak vegetation

Crops and products	Sold		Plan to sell		Personal or on-farm use	
	#	%	#	%	#	%
Firewood	290	10.6	212	7.8	1868	68.3
Trees for timber products	471	17.2	546	20.0	794	29.0
Trees for non-timber products	226	8.3	218	8.0	944	34.5
Forage/hay/fodder for livestock	269	9.8	181	6.6	1055	38.6
Edible crops	193	7.1	221	8.1	953	34.9
Medicinal plants	52	1.9	107	3.9	392	14.3
Decorative plants and or landscape materials	88	3.2	85	3.1	468	17.1
Other crops and products	105	3.8	90	3.3	288	10.5

Table 28a: Number and percent of respondents who sold crops & products from windbreak vegetation

	Farmstead-only (n = 186)		Field-only (n = 107)		Livestock-only (n = 171)		Boundary-only (n = 123)		Hedgerow-only (n = 123)		All windbreaks (n = 2734)	
Crops and products	#	%	#	%	#	%	#	%	#	%	#	%
Firewood	12	6.5	6	5.6	18	10.5	6	4.9	10	8.1	290	10.6
Trees for timber products	22	11.8	6	5.6	37	21.6	20	16.3	18	14.6	471	17.2
Trees for non-timber products	8	4.3	P	0.9-3.7	13	7.6	9	7.3	9	7.3	226	8.3
Forage/hay/fodder for livestock	12	6.5	6	5.6	12	7.0	10	8.1	11	8.9	269	9.8
Edible crops	11	5.9	11	10.3	7	4.1	8	6.5	P	0.8-3.3	193	7.1
Medicinal plants	P	0.5-2.2	P	0.9-3.7	P	0.6-2.3	P	0.8-3.3	P	0.8-3.3	52	1.9
Decorative plants and or landscape materials	P	0.5-2.2	P	0.9-3.7	P	0.6-2.3	P	0.8-3.3	P	0.8-3.3	88	3.2
Other crops and products	P	0.5-2.2	5	4.7	5	2.9	7	5.7	P	0.8-3.3	105	3.8

Table notes: cell values with a “P” represent the presence of data where n < 5. The specific value could not be shown due to disclosure rules.

Table 28b: Number and percent of respondents who plan to sell crops and products from windbreak vegetation

	Farmstead-only (n = 186)		Field-only (n = 107)		Livestock-only (n = 171)		Boundary-only (n = 123)		Hedgerow-only (n = 123)		All windbreaks (n = 2734)	
Crops and products	#	%	#	%	#	%	#	%	#	%	#	%
Firewood	5	2.7	5	4.7	9	5.3	8	6.5	9	7.3	212	7.8
Trees for timber products	27	14.5	17	15.9	30	17.5	27	22.0	19	15.4	546	20.0
Trees for non-timber products	7	3.8	P	0.9-3.7	13	7.6	12	9.8	8	6.5	218	8.0
Forage/hay/fodder for livestock	6	3.2	P	0.9-3.7	10	5.8	P	0.8-3.3	5	4.1	181	6.6
Edible crops	11	5.9	7	6.5	5	2.9	10	8.1	P	0.8-3.3	221	8.1
Medicinal plants	5	2.7	P	0.9-3.7	6	3.5	P	0.8-3.3	P	0.8-3.3	107	3.9
Decorative plants and or landscape materials	P	0.5-2.2	P	0.9-3.7	P	0.6-2.3	P	0.8-3.3	P	0.8-3.3	85	3.1
Other crops and products	P	0.5-2.2	5	4.7	P	0.6-2.3	P	0.8-3.3	P	0.8-3.3	90	3.3

Table notes: cell values with a “P” represent the presence of data where n < 5. The specific value could not be shown due to disclosure rules.

Table 28c: Number and percent of respondents who use crops and products for personal use from windbreak vegetation

	Farmstead-only (n = 186)		Field-only (n = 107)		Livestock-only (n = 171)		Boundary-only (n = 123)		Hedgerow-only (n = 123)		All windbreaks (n = 2734)	
Crops and products	#	%	#	%	#	%	#	%	#	%	#	%
Firewood	107	57.5	49	45.8	114	66.7	77	62.6	62	50.4	1868	68.3
Trees for timber products	43	23.1	17	15.9	51	29.8	31	25.2	28	22.8	794	29.0
Trees for non-timber products	46	24.7	25	23.4	63	36.8	35	28.5	38	30.9	944	34.5
Forage/hay/fodder for livestock	48	25.8	20	18.7	76	44.4	42	34.1	36	29.3	1055	38.6
Edible crops	44	23.7	21	19.6	50	29.2	39	31.7	35	28.5	953	34.9
Medicinal plants	28	15.1	12	11.2	29	17.0	23	18.7	16	13.0	392	14.3
Decorative plants and or landscape materials	30	16.1	16	15.0	30	17.5	26	21.1	20	16.3	468	17.1
Other crops and products	15	8.1	12	11.2	26	15.2	14	11.4	22	17.9	288	10.5

Table 29: Number and percent of respondents reporting various edible products being sold, plan to be sold, or used for personal use from their windbreaks (n = 727)

Edible crops and products	#	%
Raspberry	169	23.25
Walnut (black and white)	166	22.83
Sugar maple (syrup)	105	14.44
Blackberry	102	14.03
Pecan	70	9.63
Apple	65	8.94
Berries (unspecified)	56	7.70
Blueberry	52	7.15
Plum (includes wild)	45	6.19
Hazelnut/filbert	37	5.09
Elderberry	34	4.68
Nuts (unspecified)	29	3.99
Pear	29	3.99
Cherry	27	3.71
Grape	20	2.75
Mulberry	20	2.75
Peach	20	2.75
Fruit trees (unspecified)	19	2.61
Fruits (unspecified)	17	2.34
Hickory nuts	17	2.34
Mushroom	17	2.34
Pawpaw	15	2.06
Persimmon	15	2.06
Chestnut	14	1.93
Chokecherry	12	1.65
Strawberry	12	1.65

Currant	10	1.38
Juneberry/serviceberry	8	1.10
Vegetables (unspecified)	7	0.96
Honey	6	0.83
Apricot	5	0.69
Cranberry (includes high bush)	5	0.69

Tables notes: data comes from an open-ended question. There were 97 different edible crops.

Edible crops where $n < 5$ included acorn, aronia/chokeberry, asparagus, avocado, banana, Barbados cherry, bay leaf, beautyberry, beet, boysenberry, broccoli, buffaloberry, carob, carrot, collards, corn, crabapple, dewberry, dragon fruit, fig, flowers (unspecified), garlic, gooseberry, grain, haskap/honeyberry, hawthorn berry, hay, heartnut, herbs, hops, huckleberry, kale, kiwi, kumquat, lavender, lettuce, loquat, lychee, mango, muscadine berry, nectarine, nettle, olive, onion, passion fruit (lilikoe), pepper, pomegranate, potato, prickly pear fruit, ramps/wild leek, sap (unspecified), seaberry/sea buckthorn, spinach, squash, star fruit, sugarcane, sunflower, thimbleberry, tomato, turnip, wineberry, winter pea, winter rye, and winter wheat.

Table 30: Number and percent of respondents reporting various medicinal plants and herbs being sold, plan to be sold, or used for personal use from their windbreaks (n = 179)

Medicinal plants/products	#	%
Ginseng	34	18.99
Elderberry	25	13.97
Herbs (unspecified)	15	8.38
Goldenseal	13	7.26
Mint/spearmint	9	5.03
Lavender	7	3.91
Nettle	7	3.91
Mushroom	6	3.35
Rose/rose hip	5	2.79

Table notes: data comes from an open-ended question. There were 99 different medicinal crops listed by producers.

Medicinal plants and products where $n < 5$ included aloe, apple, aronia, aster, astragalus root, balsam pear/bitter melon, balsam poplar buds, basil, bay leaf, beautyberry, beebalm, black willow, blackberry, blood root, blue vervain, blueberry, buckthorn, burdock, calendula, cannabis, catnip, cherry (teas), chickweed, chokecherry, comfrey, cota, cottonwood bud, dandelion, dill, echinacea, eucalyptus, garlic, ginger, goji berry, goldenrod, honey, hops, horse radish, hyssop, jewelweed, juniper berry, kale, ko'oko'olau, lamb's quarter, lemon balm, lions mane, mamaki, madrone, marjoram, moringa, mullein, nannyberry leaf, oregano, Oregon grape root, osage orange, osha, parsley, passion fruit leaf, pine, plantain, prickly pear, rabbit tobacco, ramp/wild leek, raspberry leaf, red twig dogwood, rosemary, sage, saffron, seaberry, shiso, snake root, St. John's wort, sunflower, tarragon, tea, thyme, trout lily, valerian, violet, wild ginger, willow leaf, witch hazel, and yarrow.

Table 31: Number and percent of respondents reporting various decorative plants and or materials for landscaping being sold, plan to be sold, or used for personal use from their windbreaks (n = 249)

Decorative plants and or landscape materials	#	%	Notes
Trees and shrubs (ornamental and nursery stock)	106	42.57	Unspecified trees (34), dogwood (10) (includes red twig), bamboo (6), oak (pin, white, red), magnolia, pine (includes eastern white), juniper (includes eastern redcedar), red bud, American boxwood, chokecherry, sugar maple, redwood, apple, aspen, white birch, butternut, crabapple, shagbark hickory, locust, pawpaw, pear, persimmon, quince, sorrel tree, walnut, and hazelnut.
Flowers (cut and ornamental)	96	38.55	Unspecified flowers (41), rose (6), azalea, lily, lavender, butterfly bush, hydrangea, iris, milkweed, myrtle, peony, sunflower, zinnia, buckeye flowers, bromeliaceae, camellia shrub, coneflower, comfrey, cherry, dianthus, forsythia, gayfeather, ginger lily, honey suckle, Jasmine, lilac, marigold, nettle, rhododendron, rosemary, sweetgum blossoms, and verbenas.
Evergreen trees and shrubs for wreaths and Christmas decorations	57	22.89	Includes Norway spruce, eastern white pine, eastern redcedar, blue spruce, holly (8), balsam fir, Douglas fir, and unspecified pines and junipers.
Not a viable response	24	9.64	
Woody material for floral arrangements	20	8.03	Grapevine (6), corkscrew willow (6), winterberry, greenbrier, laurel, privet, Oregon wintergreen, snowberry, and pachysandra.
Other	17	6.83	Includes pine straw (7), mulch, and fencing.
Other decorative material for floral arrangements	9	3.61	Ferns, grasses, and running cedar.

Table notes: data comes from an open-ended question. There were 84 unique responses provided for decorative crops and products. Several respondents listed several different decorative crops. Hence, n-values do not sum to total number of respondents.

Table 32: Number and percent of respondents reporting other crops and products being sold, plan to be sold, or used for personal use from their windbreaks (n = 255)

Other crops/products	#	%
Not a viable response	30	11.76
Hay	25	9.80
Vegetables	20	7.84
Christmas trees and wreaths	18	7.06
Pasture grass/forage	15	5.88
Corn	13	5.10
Livestock products (beef, chicken, eggs, pork, wool)	10	3.92
Apple	9	3.53
Grains (includes rye, sorghum, wheat)	9	3.53
Honey	9	3.53
Mushroom	8	3.14
Alfalfa	6	2.35
Grape	6	2.35
Chestnut (American/hybrid)	5	1.96
Oat	5	1.96
Perennial/ornamental plants	5	1.96
Plum	5	1.96
Tree material for transplants/seedlings	5	1.96

Table notes: data comes from an open-ended question. There were 88 different “other” crops and products.

Other crops and products where $n < 5$ included compost/mulch from windbreak vegetation, flowers, fruit trees, soybean, walnut (includes black and English), asparagus, cherry, herbs, holly, pumpkin, wildlife game (deer and rabbit), seed, tomato, bamboo, barley, beans, blueberry, cedar for posts, fruit, hazelnut/filbert, jam/compote, nettle, pawpaw, peach, pine, tree harvest, willow, artichoke, avocado, balsam poplar balm, banana, basketing material, basswood, berries, biochar, blackberry, breadfruit/ulu, chokecherry, cucumber, dye for fabric, elderberry, fiddlehead, fig, garlic, guava, hemp, hickory nut, lavender, lilac, honey locust, magnolia, melon, mint, mulberry, oak, okra, orchid, osha/wild parsnip, pecan, ramp/wild leek, seaberry/sea buckthorn, spices, spruce (blue), squash, sugarcane, sugar maple (syrup), sunflower, tobacco, vines, and wine.

Table 33: Future plans respondents have with their windbreaks over the next five years

	Increase acreage		Decrease acreage		Stay the same		Don't know	
Windbreak sub-type	#	%	#	%	#	%	#	%
Farmstead-only (n = 177)	30	16.9	7	4.0	119	67.2	21	11.9
Field-only (n = 101 - 104)	9	8.7 - 8.9	P	1.0 - 3.8	77	74.0 - 76.2	14	13.5 - 13.9
Livestock-only (n = 163)	15	9.2	5	3.1	118	72.4	25	15.3
Boundary-only (n = 107 - 110)	15	13.6 - 14.0	P	0.9 - 3.6	81	73.6 - 75.7	10	9.1 - 9.3
Hedgerow-only (n = 117)	18	15.4	5	4.3	85	72.6	9	7.7
All windbreak types (n = 2583)	504	19.5	117	4.5	1,721	66.6	241	9.3

Table notes: cell values with a “P” represent the presence of data where n < 5. The associated percents are shown as a range to accommodate disclosure rules.

Table 34: Reasons respondents provided for increasing the acres they have in windbreaks over the next 5 years (n = 452)

Reasons for increasing windbreak acreage	#	%	Notes
Adding new windbreaks to an existing farm operation (continually planting)	88	19.47	
Planting trees adjacent to an existing windbreak	61	13.50	
Not a viable response	48	10.62	
Crops from windbreak trees/vegetation	43	9.51	Includes fruit/nuts, Christmas trees, pine straw, and firewood.
More wildlife habitat/biodiversity	36	7.96	
Natural growth/expansion	31	6.86	
Adding windbreaks to new land	20	4.42	
Livestock protection	20	4.42	
Additional wind control needed	20	4.42	
Aesthetics/visual screen/boundary lines	19	4.20	
Stream protection and flood control	12	2.65	
Conservation	12	2.65	
Government program	11	2.43	Includes CREP, CRP, and EQIP.
Erosion control	10	2.21	
Like windbreaks and trees	9	1.99	
Improve livestock forage	8	1.77	
Control of drift (chemical, dust, odor)	5	1.11	
Other	13	2.88	Other included farmstead protection, shade, water capture and storage, next generation, snow management, fire control, and sound control.

Table notes: data comes from an open-ended question. Several respondents selected multiple reasons for increasing their windbreak acreage. Hence, n-values do not sum to total number of respondents.

Table 35: Reasons respondents provided for decreasing the acreage they have in windbreaks over the next five years (n = 105)

Reasons for decreasing acreage	#	%	Notes
Thinning/removing trees due to overgrowth or encroachment into adjacent fields	20	19.05	
Cleared for more pasture, cropland, or orchard	18	17.14	
Weather mortality	13	12.38	Drought, tornado, and fire.
Old and dying trees	12	11.43	
Not a viable response	10	9.52	
Harvested trees	9	8.57	
Changed farm layout	8	7.62	Includes field consolidation, center pivot, and larger machinery.
Insect pests	7	6.67	Includes emerald ash borer and spruce beetle.
Other	11	10.48	Other included tree disease, did not re-enroll in conservation program, sold land, wildlife pests, too busy, herbicide drift, increased sunlight hours, and retired.

Table notes: data comes from an open-ended question.